

Amarendra Edpuganti, PhD

Assistant Professor, Dept of SEE, IIT Kanpur, India

Email ID: amarendrac@iitk.ac.in

SUMMARY

I am a passionate educator and researcher working in power electronics converters for sustainable technologies. Author/co-author of more than 50 peer reviewed publications and inventor for 4 international patents and 3 Indian patents.

RESEARCH INTERESTS

➤ **Power electronics applications**

- Electrical vehicles
- Fuel cell applications
- Renewable energy integration

EDUCATION

Ph.D. : National University of Singapore, Singapore; Electrical and Computer Eng.; February 2016.

M.Tech. : Indian Institute of Technology, Kanpur, India; Electrical Eng.; July 2012.

B.Tech. : National Institute of Technology, Warangal, India; Electrical Eng.; July 2007.

PROFESSIONAL EXPERIENCE

1. Department of Sustainable Energy Engineering, IIT Kanpur, Kanpur, India
Assistant Professor, **December 2022 – Present**
2. Advanced Power and Energy Center (APEC), Khalifa University, Abu Dhabi, United Arab Emirates
Research Scientist, **July 2022 – December 2022 (6 months)**
Post-doctoral fellow, **Nov 2020 – June 2022 (1 year 8 months)**
3. MI-MIT Collaboration Research, Khalifa University, Abu Dhabi, United Arab Emirates
Post-doctoral fellow, **July 2018 – Oct 2020 (2 year 3 months)**
4. ABB India Development Centre, Chennai, India,
R&D Engineer, **October 2015 – July 2018 (2 year 9 months)**
5. Adobe Systems India Private Limited, Bangalore, India,
Software Engineer, **August 2007 – December 2009 (2 year 4 months)**

TECHNICAL SKILLS

- **Programming Languages:** C, C++.
- **Tools & Software:** PSCAD, HiDraw, MATLAB/SIMULINK, PSIM, PLECS, FPGA, DSP, Microcontroller, Altium Designer, Code composer studio (CCS).
- System analysis and mathematical modeling, PCB design, Experimental validation of concepts.

TEACHING :

- SEE 627 – Electric vehicles: 2022-23 Sem II, 2023-2024 Sem II, 2024-25 Sem I
- SEE 627 – Electric Mobility: 2025-26 Sem I
- SEE 623 – Fuel cell electrical energy systems: 2023-24 Sem I.
- SEE 633 – Power Electronics for Electric Vehicles: 2024-25 Sem II

HONORS AND AWARDS

- **Best poster presentation award** in IEEE SEFET 2025 conference
- My student Gudelli Shivakumar (MTech,2022-24) was awarded **Chandrakantha Kesavan Best Research Thesis Award in 2024.**
- My student Siddharth Raj (M.Tech, 2023-25) was awarded **Chandrakantha Kesavan Best Research Thesis Award in 2025.**
- **All India Rank-26 (99.95 percentile)** in Graduate Aptitude Test in Engineering (GATE)-2010.
- Awarded **3rd prize in IEEE IAS CMD Student Thesis Contest 2016** in the PhD category.
- Awarded **1st prize paper award in 2020 IAS Annual Meeting** conference.
- Awarded **NUS Research Scholarship** for Ph.D. by National University of Singapore for 2012-2016.

PATENTS

1. P. Bajpai, **A. Edpuganti**, V.K. Yadav, P. Kumar, and R.P Priya, “Fuel cell and battery hybrid powered electric tower car with DC traction motor”, **Indian 202411068288**. (Filed on 10th Sept 2024)
2. **A. Edpuganti**, P. Bajpai, V.K. Yadav, and P. Kumar, “Battery powered tower car with dc traction motor and method thereof”, **Indian 568490**. (Granted from 29/11/2024)
3. P. Kumar, V.K. Yadav, **A. Edpuganti**, and P. Bajpai, “Control and system architecture for hybrid powered electric tower car with AC traction motor”, **Indian 202511040495**. (Filed on 26th April 2025).
4. **A. Edpuganti**, V. Khadkikar, H. Zieneldin, and M. S. Elmoursi, “Multiport converters, Multiple-input Multiple-output converters, and Power-down Modes for Satellite electric power system”, US 18549467. (Published on 16 May 2024).
5. Vinod Khadkikar, Radha Kushwaha, Hatem Zeineldin, Hadi Otrok, and Rabeb Mizouni, Shakti Singh, Umesh S. Baktharahalli, Abass Afolabi Yahaya, and **Amarendra E**, “EV Chargers and EV Charging”, US 18038557 (Published on 4 Jan 2024).
6. Malaya Sahu, Hongbo Jiang, V Vekhande, M Holm, Sasitharan S, Praveen B, and **Amarendra E**, “Voltage source converters and method of energization thereof”. WO 2020/049375 A1.
7. **Amarendra E**, Khirod Kumar Nayak, Gaurav Kumar Kasal and Sasitharan S, “Series Modular DC to DC converter”, WO 2019/238239 A1.

Sponsored Research:

1. **ANRF's PAIR**: “Synergistic development of Semiconductor and Digital Technologies for Automotive Sector”, Duration: 1 year (2025-26), Funding: 1 Crore, Role: **Co-PI**.
2. **ANRF's MAHA EV**: “Grid Readiness for EV: Enablers and Technological developments (GREET)”, Duration: 3 years (2025-27), Funding: 47.45 Crores, Role: **Co-PI**
3. **Mars Mobility**: “Design, Development, Fabrication, And Testing Of Smart Ev Charges And Smart Hybrid Inverters For Ess Application”, Duration:1 year (2025-26), Funding: 17.7 Lakhs, Role: **PI**
4. **Mars Mobility**: “Design, Development, Fabrication, Testing And Integration Of Smart Energy Management System For Hybrid Micro-Grid And Scale Energy Storage Applications”. Duration:1 year (2025-26), Funding: 17.7 Lakhs, Role: **Co-PI**
5. **IITK DORA**: “**Customized EV Drive Train Test Setup**”, Duration: 1 year (2024-25), Funding: 75 Lakhs, Role: **Co-PI**.
6. **SERB Start-up Research Grant**: “New Compact and Efficient Multiport Converter For The CubeSat Electric Power System”. Duration: **2 years (2023-25)**, Funding: **30.9 Lakhs**. Role: **PI**.
7. **IITK Start-up research grant**: “Development of New Power Converters For Fuel Cell Electrical Energy System”. Duration: **3 years (2022-25)**, Funding: **25 Lakhs**. Role: **PI**.

PUBLICATIONS

BOOK CHAPTERS

1. R. Kushwaha, A. Edpuganti, and V. Khadkikar, "Power quality aspects of smart grid in presence of electric vehicle charging", in book "Design and Control of Active Power Filters towards the Decarbonisation of Smart Grid Networks", Elsevier 2025.

JOURNALS

1. A. A. Yahaya, **A. Edpuganti**, V. Khadkikar and H. Zeineldin, "A Novel Simultaneous AC and DC Charging Scheme for Electric Vehicles," in *IEEE Transactions on Energy Conversion*, vol. 39, no. 3, pp. 1534-1546, Sept. 2024, doi: 10.1109/TEC.2024.3381280.
2. R. Kushwaha, V. Khadkikar and **A. Edpuganti**, "Electric Vehicle On-Board Fast Charging Through Converter Maximum Switch Utilization," in *IEEE Transactions on Power Electronics*, vol. 39, no. 1, pp. 998-1014, Jan. 2024, doi: 10.1109/TPEL.2023.3321760.
3. A. A. Saafan, V. Khadkikar, **A. Edpuganti**, M. S. E. Moursi and H. H. Zeineldin, "A Novel Nonisolated Four-Port Converter for Flexible DC Microgrid Operation," in *IEEE Transactions on Industrial Electronics*, vol. 71, no. 2, pp. 1653-1664, Feb. 2024, doi: 10.1109/TIE.2023.3257360.
4. **A. Edpuganti**, V. Khadkikar, N. Al Sayari and B. Zahawi, "Single-Inductor Multiple-Input–Multiple-Output Converter for CubeSats Electric Power System," in *IEEE Transactions on Power Electronics*, vol. 38, no. 5, pp. 6319-6336, May 2023, doi: 10.1109/TPEL.2023.3243928.
5. A. Edpuganti, V. Khadkikar, H. Zeineldin, M. S. E. Moursi and M. A. Hosani, "Enhancing Lifetime of 1U/2U CubeSat Electric Power System With Distributed Architecture and Power-Down Mode," in *IEEE Transactions on Industry Applications*, vol. 58, no. 1, pp. 901-913, Jan.-Feb. 2022, doi: 10.1109/TIA.2021.3128373.
6. **A. Edpuganti**, V. Khadkikar, M. S. Elmoursi, H. Zeineldin, N. Alsayari, and K. Al Hosani, "A Comprehensive Review on CubeSat Electrical Power System Architectures," in *IEEE Transactions on Power Electronics*, vol. 37, no. 3, pp. 3161-3177, March 2022, doi: 10.1109/TPEL.2021.3110002.
7. **A. Edpuganti**, V. Khadkikar, M. S. El Moursi and H. Zeineldin, "A Novel Multiport Converter Interface for Solar Panels of CubeSat," in *IEEE Transactions on Power Electronics*, vol. 37, no. 1, pp. 629-643, Jan. 2022.
8. **A. Edpuganti**, V. Khadkikar, H. Zeineldin, M. S. El Moursi and M. Al Hosani, "Comparison of Peak Power Tracking Based Electric Power System Architectures for CubeSats," in *IEEE Transactions on Industry Applications*, vol. 57, no. 3, pp. 2758-2768, May-June 2021.
9. K.Gnanasambandam; **A. Edpuganti**; A.K. Rathore; D.Srinivasan; and J.Rodriguez, "Hybrid SVM-SOPWM Modulation of Current-Fed Three-level Inverter for High Power Application", *IEEE Transactions on Industry Applications*, vol. 55, no. 4, pp. 4344-4358, July-Aug. 2019.
10. C. Buccella; C. Cecati; M. G. Cimatori; G. Kulothungan; **A. Edpuganti**; A. K. Rathore, "A Selective Harmonic Elimination Method for 5-Level Converters for Distributed Generation," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 5, no. 2, pp. 775-783, June 2017.
11. K. Gnanasambandam; **A. Edpuganti**; A. Rathore; and D. Srinivasan, "Modified Synchronous Pulse Width Modulation of Current-Fed Five-Level Inverter for Solar Integration," *IEEE Transactions on Power Electronics*, vol. 32, no. 5, pp. 3370-3381, May 2017.
12. K.Gnanasambandam; A.K. Rathore; **A. Edpuganti**; D.Srinivasan; and J.Rodriguez, "Current-fed Multilevel Converters: An Overview of Circuit Topologies, Modulation Techniques, and Applications," *IEEE Transactions on Power Electronics*, vol. 32, no. 5, pp. 3382-3401, May 2017.
13. **A. Edpuganti** and A. K. Rathore, "Optimal Pulsewidth Modulation for Common-Mode Voltage Elimination Scheme of Medium-Voltage Modular Multilevel Converter-Fed Open-End Stator Winding Induction Motor Drives," *IEEE Transactions on Industrial Electronics*, vol. 64, no. 1, pp. 848-856, Jan. 2017.
14. K. Gnanasambandam, **A. Edpuganti**, A. K. Rathore, D. Srinivasan, C. Cecati and C. Buccella, "Optimal Low Switching Frequency Pulsewidth Modulation of Current-Fed Three-Level Converter

- for Solar Power Integration," *IEEE Transactions on Industrial Electronics*, vol. 63, no. 11, pp. 6877-6886, Nov. 2016.
15. **A. Edpuganti** and A. K. Rathore, "Optimal Pulsewidth Modulation of Medium-Voltage Modular Multilevel Converter," *IEEE Transactions on Industry Applications*, vol. 52, no. 4, pp. 3435-3442, July-Aug. 2016.
 16. **A. Edpuganti** and A. K. Rathore, "A Survey of Low Switching Frequency Modulation Techniques for Medium-Voltage Multilevel Converters," *IEEE Transactions on Industry Applications*, vol. 51, no. 5, pp. 4212-4228, Sept.-Oct. 2015.
 17. **A. Edpuganti** and A. K. Rathore, "New Optimal Pulsewidth Modulation for Single DC Link Dual Inverter-fed Open-end Stator Winding Induction Motor Drive," *IEEE Transactions on Power Electronics*, vol. 30, no. 8, pp. 4386-4393, Aug. 2015.
 18. **A. Edpuganti** and A. K. Rathore, "Fundamental Switching Frequency Optimal Pulse Width Modulation of Medium Voltage Cascaded Seven-Level Inverter," *IEEE Transactions on Industry Applications*, vol. 51, no. 4, pp. 3485-3492, July-Aug. 2015.
 19. **A. Edpuganti** and A. K. Rathore, "Fundamental Switching Frequency Optimal Pulsewidth Modulation of Medium Voltage Nine-Level (9L) Inverter," *IEEE Transactions on Industrial Electronics*, vol. 62, no. 7, pp. 4096-4104, July. 2015.
 20. **A. Edpuganti** and A. K. Rathore, "Optimal Low Switching Frequency Pulsewidth Modulation of Nine-Level (9L) Cascade Inverter," *IEEE Transactions on Power Electronics*, vol. 30, pp. 482-495, Jan. 2015.
 21. **A. Edpuganti** and A. K. Rathore, "Optimal Low Switching Frequency Pulse Width Modulation of Medium Voltage Seven-Level (7L) Cascade-5/3H Inverter," *IEEE Transactions on Power Electronics*, vol. 30, no. 1, pp. 496-503, Jan. 2015.

CONFERENCES

1. P. Kumar, V. K. Yadav, **A. Edpuganti**, P. Bajpai, and R. P. Priya, "Powertrain Architecture and Control System Design for Overhead Line and Battery Powered Railway Tower Car", 2025 IEEE Energy Conversion Congress and Exposition (ECCE)- Asia, **Presented**.
2. A. Pandey, M. Donkena, S. Samanta and **A. Edpuganti**, "Precise Analytical Model Assisted Machine Learning Framework for Parameter Estimation of Litz-Wire and Ferrite Core-based Rectangular WPT Coils with Lateral Misalignment", 2025 IEEE Energy Conversion Congress and Exposition (ECCE)- Asia, **Presented**.
3. G. Shivakumar, B. Panda and **A. Edpuganti**, "Triple Active Bridge Converter for Solar PV-Assisted EV Charging," 2024 *IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Mangalore, India, 2024, pp. 1-6, doi: 10.1109/PEDES61459.2024.10961387.
4. G. Shivakumar, P. Lokanadham, B. Panda and **A. Edpuganti**, "A Novel Control Technique for Dual Active Bridge Converter," 2024 *IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Mangalore, India, 2024, pp. 1-5, doi: 10.1109/PEDES61459.2024.10961426.
5. A. Pandey, S. Samanta and **A. Edpuganti**, "Accurate Modeling Approach of Litz-Wire Based Planar DD Spiral Coils for WPT Applications," 2024 *IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Mangalore, India, 2024, pp. 1-6, doi: 10.1109/PEDES61459.2024.10961509.
6. R. P. Priya, S. Vishwanatha, V. K. Yadav, **A. Edpuganti** and P. Bajpai, "Operation and Control of Fuel Cell Powered Tower Wagon," 2024 *IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024, pp. 2328-2333. doi: 10.1109/ECCE55643.2024.10860911.
7. V. K. Yadav, **A. Edpuganti** and P. Bajpai, "New High Gain Boost Converter for Fuel Cell Electric Vehicle," 2024 *IEEE Energy Conversion Congress and Exposition (ECCE)*, Phoenix, AZ, USA, 2024, pp. 606-613. doi: 10.1109/ECCE55643.2024.10861213.
8. M. Satapathy and **A. Edpuganti**, "Analysis of Step-Up Partial Power Processing Converter Architecture for Electric Vehicle Fast Charging Station," 2024 *IEEE 4th International Conference on Sustainable Energy and Future Electric Transportation (SEFET)*, Hyderabad, India, 2024, pp. 1-6, doi: 10.1109/SEFET61574.2024.10718043.

9. G. Shivakumar, V. Siddhartha, V. K. Yadav and **A. Edpuganti**, "Systematic Analysis and Control of Quad-Active-Bridge Converter for EV Charging," *2024 IEEE 4th International Conference on Sustainable Energy and Future Electric Transportation (SEFET)*, Hyderabad, India, 2024, pp. 1-6, doi: 10.1109/SEFET61574.2024.10717968.
10. M. Satapathy, V. Siddhartha, G. Shivakumar, and **A. Edpuganti**, "Analysis and Comparison of Partial Power Processing Converter Architectures for EV Fast Charging Station," *2023 IEEE International Transportation Electrification Conference (ITEC-India)*, Chennai, India, 2023, pp. 1-6, doi: 10.1109/ITEC-India59098.2023.10471470.
11. V. Siddhartha, G. Shivakumar and **A. Edpuganti**, "Modeling and Control of Dual Active Bridge Converter for EV Charging," *2023 IEEE International Conference on Energy Technologies for Future Grids (ETFG)*, Wollongong, Australia, 2023, pp. 1-6.
12. R. P. Priya, G. Shivakumar, V. Siddhartha and **A. Edpuganti**, "Review of Fuel Cell Power Converter Topologies for Electric Vehicles," *IECON 2023- 49th Annual Conference of the IEEE Industrial Electronics Society*, Singapore, 2023, pp. 1-6.
13. K. Shahare, V. Siddhartha, M. Satapathy, **A. Edpuganti** and R. Jindal, "Solar PV-Assisted Charging System for Electric Vehicles," *2023 IEEE 3rd International Conference on Sustainable Energy and Future Electric Transportation (SEFET)*, Bhubaneswar, India, 2023, pp. 1-6.
14. **A. Edpuganti**, V. Khadkikar and H. Zeineldin, "Single-Input Multiple-Output Converter for CubeSat Electric Power System," *2022 IEEE 2nd International Conference on Sustainable Energy and Future Electric Transportation (SeFeT)*, 2022, pp. 1-5.
15. **A. Edpuganti**, V. Khadkikar, M. S. Elmoursi, H. Zeineldin and M. Al Hosani, "A Novel EPS Architecture for 1U/2U Cubesats with Enhanced Fault-Tolerant Capability," *2020 IEEE Industry Applications Society Annual Meeting*, Detroit, MI, USA, Oct 2020, pp. 1-6.
16. **A. Edpuganti**, V. Khadkikar, H. Zieneldin, M. S. Elmoursi, and M. Al Hosani, "New Submodule Selection Algorithm for Low Device Switching Frequency Modulation of Medium-Voltage Modular Multilevel Converter", *IEEE ICIT 2020*, Buenos Aires, Argentina.
17. **A. Edpuganti**, V. Khadkikar, H. Zieneldin, M. S. Elmoursi, and M. Al Hosani, "Comparison Study of Electric Power System Architectures for CubeSat", *IEEE PESGRE 2020*, Cochin, India.
18. K. Gnanasambandam, A. K. Rathore, **A. Edpuganti** and D. Srinivasan, "A Novel Optimal Space Vector Modulation Technique of Current Source Inverter for Solar Power Integration," *IEEE PEDES 2018*, Chennai, India.
19. K. Gnanasambandam, A. K. Rathore, **A. Edpuganti** and D. Srinivasan, "Hybrid SVM-SOPWM Modulation of Current-Fed Three-level Inverter for High Power Application," *IEEE IAS Annual meeting 2017*, Cincinnati, OH, USA.
20. K. Gnanasambandam, A. K. Rathore, **A. Edpuganti** and D. Srinivasan, "Current-fed multilevel converters: An overview of circuit topologies and modulation techniques," *IEEE IAS Annual meeting 2016*, Portland, OR, USA.
21. **A. Edpuganti**, A. K. Rathore and B. M. Joshi, "Optimal low-switching frequency pulsewidth modulation of dual modular multilevel converter for medium-voltage open-end stator winding induction motor drive," *IEEE IECON 2016*, Florence, Italy.
22. K. Gnanasambandam, A. K. Rathore, **A. Edpuganti** and D. Srinivasan, "Optimal low switching frequency pulse width modulation of current-fed three-level inverter for solar integration," *2016 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Long Beach, CA, USA.
23. K. Gnanasambandam, A. K. Rathore, **A. Edpuganti** and D. Srinivasan, "Optimal low switching frequency pulse width modulation of current-fed five-level inverter for solar integration," *2016 IEEE Applied Power Electronics Conference and Exposition (APEC)*, Long Beach, CA, USA.
24. **A. Edpuganti**, A. Dwivedi, A. K. Rathore and R. K. Srivastava, "Optimal pulsewidth modulation of cascade nine-level (9L) inverter for medium voltage high power industrial AC drives," *IEEE IECON 2015*, Yokohama, Japan.
25. **A. Edpuganti** and A. K. Rathore, "Optimal Pulsewidth Modulation of Medium-Voltage Modular Multilevel Converter," *IEEE IAS Annual meeting 2015*, Dallas, USA.

26. **A. Edpuganti**, A. K. Rathore and A.K. Gupta, "Optimal Fundamental Switching Frequency Pulsewidth Modulation of Medium-Voltage Cascade Nine-Level (9L) Inverter," *IEEE PEDES 2014*, Mumbai, India.
27. **A. Edpuganti** and A. K. Rathore, "A Survey of Low Switching Frequency Modulation Techniques for Medium-Voltage Multilevel Converters," *IEEE IAS Annual meeting 2014*, Vancouver, Canada.
28. **A. Edpuganti** and A. K. Rathore, "Fundamental Switching Frequency Optimal Pulse Width Modulation of Medium Voltage Cascaded Seven-Level Inverter," *IEEE IAS Annual meeting 2014*, Vancouver, Canada.
29. **A. Edpuganti**, A. K. Rathore and J. Holtz, "New optimal pulsewidth modulation for dual inverter-fed open-end stator winding induction motor drive," *IEEE ECCE 2014*, Pittsburgh, USA.
30. **A. Edpuganti** and A. K. Rathore, "Optimal low switching frequency pulsewidth modulation of medium voltage seven-level cascade-5/3H inverter," *IEEE IECON 2013*, Vienna, Austria.

PROFESSIONAL SERVICES

Conference Organizing Committee:

- 1) **Track Chair:** ITEC India 2017, IECON 2023, PEDES 2024, SEFET 2025.
- 2) **Session Chair:** SEFET 2022, ITEC India 2023, SEFET 2025.
- 3) **Special session organizer:** IECON 2023

Reviewer of Journals and Conferences: IEEE

- 1) IEEE Journals and Transactions
- 2) IET Power Electronics
- 3) Major IEEE conferences: APEC, IECON, PEDES, ISIE, ECCE, IAS Annual meeting etc.